in outline, showed no evidence of invasion of the lung fields, and was separate from the cardiovascular shadows. Displacement of the esophagus in the right upper mediastinum was demonstrated by a swallow of barium (Figures 1 and 2).

The patient became progressively worse despite supporting measures that included intranasal administration of oxygen. The day after the patient entered the hospital an emergency thoracotomy was done in the right chest with intratracheal anesthesia. The intratracheal tube was passed with moderate difficulty, but after it was in place the patient's condition improved abruptly. Upon inspection and palpation of the right side of the chest a 10 x 8 cm. firm mass was noted in the superior mediastinum. There were no other abnormalities. The mass, which did not pulsate, was located between the esophagus dorsally and the trachea ventrally, with the azygos vein coursing inferiorly around it.

The mediastinal pleura was infiltrated with 1 per cent procaine solution and was incised. Then with blunt dissection the mass was entirely freed. The tumor was perforated during removal and a large amount of old and recent blood extruded. The tumor, a very thin-walled cyst into which there had been recent bleeding under tension, had displaced the esophagus dorsally and compressed the trachea ventrally. The patient's condition improved further when the mass was removed. Inspection was made to be sure that all of the cyst wall was removed. There was no evidence of cyst superiorly toward the neck, nor was there any connection to the thyroid gland. One suture loosely approximated the mediastinal pleural edges. A dependent catheter was placed through a stab wound in the chest wall and the chest wall was closed. At the close of the operation the patient's condition was excellent, even after the intratracheal tube was removed. The postoperative course was one of rapid improvement.

In a film taken at bedside the day after operation the site of the mass was scarcely visible and the lung appeared to be properly aerated. The pathologist's report on the material removed showed the tumor to be a simple thyroid cyst of the mediastinum. In places, the cyst wall was only 2 to 3 cells in thickness and there was evidence of bleeding into the cyst. There was no indication of malignant change.

An x-ray film of the chest taken on the eighth postoperative day showed a small amount of fluid in the right pleural cavity. A film taken three weeks later revealed that the chest had cleared; no mediastinal tumor could be seen.

Some five weeks later, because the patient continued to have some cough and episodes of fright because of mild dyspnea upon exertion, more films of the chest were taken. No abnormality was observed. Bronchoscopy was done, and no pathologic changes were seen. The patient thereafter was well, without complaints, and resumed his normal activity and work.

DISCUSSION

Thyroid adenomas and substernal goiters were common in the cases reported upon by Blades,[1] by Brewer and Dolley[2] and by Samson and Dugan.[3] No case of simple thyroid cyst of the mediastinum was reported by those investigators or elsewhere in the available medical literature. The present case, then, was an unusual one. From a surgical point of view it illustrates emergency thoracotomy in a patient who was asphyxiating from tracheal compression. Finally, it shows the dramatic response to the emergency removal of a benign tumor of the superior mediastinum.

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Gastrointestinal Hemorrhage Associated with Meckel's Diverticulum

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ULCERATION associated with a Meckel's diverticulum can be an obscure source of gastrointestinal hemorrhage.

The reported incidence of Meckel's diverticulum, as determined from autopsy material, varies from one per cent to three per cent and the incidence is twice as high in males as in females.[1] Although the diverticulum is usually located within the first three feet of ileum above the ileocecal valve, McGraw[3] stated that in 28 per cent of a series of cases studied by him the anomaly was at a higher level; and he emphasized the importance of examining the terminal six feet of ileum at the time of exploration in search for a Meckel's diverticulum. McGraw also stated that as Meckel's diverticulum is associated with pathological changes in about half the cases in which it is present, it is advisable to remove any so-called normal Meckel's diverticulum that may be observed during abdominal exploration.

The pathological conditions occurring in association with a Meckel's diverticulum have been classified by Greenblatt[2] into several groups:

1. The peptic group, in which gastric mucosa is present in the diverticulum. Ulceration may result, and perforation or hemorrhage may occur.

2. The inflammatory group, in which acute inflammation exists and perforation or gangrene may occur.

3. The obstructive group, with resulting intestinal obstruction due to intussusception, volvulus, or adhesions and bands.

4. The tumor group, including both benign and malignant growths.

5. The umbilical group, including fistulas and cysts.

Heterotopic tissue is found in 15 to 25 per cent of all Meckel's diverticula, and in 60 to 75 per cent of diverticula that are producing symptoms.[2] Gastric mucosa is the tissue most commonly found, and the next most common is duodenal tissue. Occasionally pancreatic tissue may be present. Such gastric mucosa may secrete gastric juice, resulting in erosion or ulceration of the adjacent ileal mucosa, with subsequent hemorrhage or perforation of the ulcer.

The following case report is an example of rather severe gastrointestinal hemorrhage associated with ulceration of the ileal mucosa just distal to the opening of a Meckel's diverticulum.

REPORT OF A CASE

A 49-year-old woman who was admitted to the Samuel Merritt Hospital on July 28, 1951, had been well until she awoke at five o'clock in the morning on the day of admittance to the hospital and passed a considerable amount of dark, tarry material by rectum. In the next hour, four tarry, liquid stools were passed, and in the next few hours there were eight to ten further passages of tarry material. The patient fainted then and was brought into the hospital

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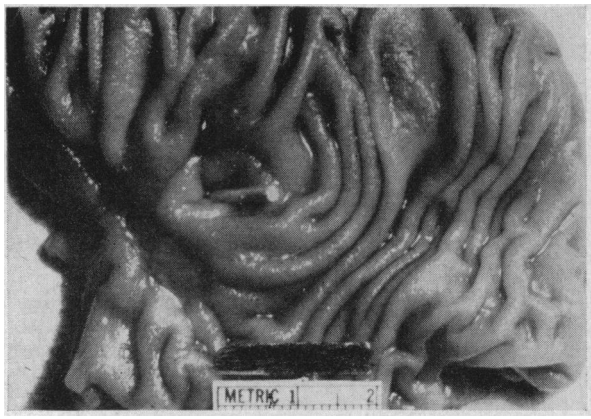

Figure 1.—Photograph of the mucosa of the ileum with probe extending into the diverticulum. Large ulcer with small one adjacent are just below and to the left of the probe.

at 4:30 p.m. There was never any associated pain, nausea or hematemesis.

The patient stated that ten years previously she passed tarry stools and noted weakness for a period of two to three days. However, there was no history of epigastric burning or distress, or of nausea or vomiting. The patient said that nearly every day for 30 years she had had pains in the right lower quadrant of the abdomen, that she had been examined because of this pain and had been told that it was most likely owing to an inflammatory condition involving the right ovary.

Although pale at the time of physical examination the patient was not in a state of shock. The pulse rate was 84, and the blood pressure 116 mm. of mercury systolic and 84 mm. diastolic. An hour later the pulse rate was 80 and the blood pressure 144 mm. systolic and 90 diastolic. Respirations were 20 per minute. The temperature was 98.8° F.

There was mild tenderness in the right lower quadrant of the abdomen. Dark, tarry material was deposited on the examining finger at the time of rectal examination. No abnormality was noted in pelvic examination.

The results of urinalysis were within normal limits. The erythrocyte content of the blood was 2,760,000 per cu. mm. and the hemoglobin value was 52 per cent. Leukocytes numbered 8,150 per cu. mm. and the cell differential was normal. An infusion of two pints of blood was given the first evening the patient was in the hospital, and one pint the next day. After the second infusion of blood the hemoglobin value was 59 per cent, erythrocytes numbered 3,110,000 per cu. mm. and the cell volume was 34 per cent of the whole blood. The following day the hemoglobin value was 80 per cent and the cell volume 41 per cent.

X-ray examination of the gastrointestinal tract was carried out and a duodenal ulcer was believed to be present. This opinion was confirmed upon examination of a film made six hours later when the patient was again given barium by mouth.

Considering the age of the patient and the fact that the gastrointestinal bleeding was the second such episode it was felt that gastric resection was the treatment of choice.

Two days later a transverse incision was made in the upper abdomen. The stomach and duodenum appeared to be normal. The stomach was mobilized after ligation of the vessels along the greater curvature, and the first part of the duodenum, pylorus and stomach could then easily be examined posteriorly. There was no evidence of duodenal ulcer. Upon exploration of the small intestine, a Meckel's diverticulum was observed about 20 inches from the ileocecal valve. This area of ileum was resected and end-to-end anastomosis of the ileum was done.

The diverticulum was 1.5x2 cm. in diameter, and the diameter of the opening of the diverticulum into the ileum was 8 mm. Distal to the opening there was an ulcer 1.8x0.8x2 cm., and adjacent to it was an ulcer 3 mm. across (Figure 1). Both ulcers contained bright red blood. Microscopic examination of the mucosa of the diverticulum revealed heterotopic tissue similar to the pepsin-producing cells of the stomach. No acid-producing cells were present.

During and after the operation the patient was given blood and fluids as well as terramycin intravenously. The course was entirely uneventful, and the patient was discharged from the hospital a week after the operation.

When last observed, a year later, the patient was entirely asymptomatic and had had no pain in the right lower quadrant of the abdomen. Erythrocytes numbered 3,300,000 per cu. mm. of blood and the hemoglobin value was 72 per cent.

DISCUSSION

Complications associated with a Meckel's diverticulum are much more common in young persons, especially in children, than in persons the age of the patient in the present case.

Although no acid-producing cells were observed microscopically, the ulcerations of the ileal mucosa were probably caused by secretions from tissue in the mucosa of the diverticulum which resembled the pepsin-producing cells of the stomach. Wangensteen and co-workers[1] observed in experimental work on the esophagus that contact of acid gastric juice with the mucosa of the esophagus had a very prompt and devastating effect. Since hydrochloric acid, in concentration similar to that in the gastric juice, had very little effect alone, they concluded that it is peptic activity that is the important factor in ulcer formation.

Bleeding from an ulcer associated with a Meckel's diverticulum is usually evidenced by a "currant jelly" clot, rather than by tarry material as in the present case.

Of special interest was the disappearance of pain in the right lower quadrant of the abdomen, which the patient had had for 30 years, following removal of the portion of ileum containing the Meckel's diverticulum and the ulcers.

This case serves further to emphasize the importance of complete exploration of the gastrointestinal tract, particularly the terminal six feet of ileum, in cases in which bleeding duodenal ulcer is diagnosed and no evidence of duodenal ulceration is found upon operation. As McGraw[3] stated, massive bleeding, the most serious condition associated with a Meckel's diverticulum, can be quickly and easily controlled by excision or resection of the involved area.

SUMMARY

A brief discussion of Meckel's diverticulum has been presented, as well as reference to the complications which so often accompany this anomaly. Gastrointestinal bleeding has been particularly emphasized, and a case report pertaining to this complication has been presented.

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